From: "Dave Lochbaum" <dlochbaum@ucsusa.org>
To: "Dave Lochbaum" <dlochbaum@ucsusa.org>
Date: 4/18/05 8:56AM
Subject: Something happened at Millstone Unit 3

Good Day:

Attached is an Issue Brief (emphasis on Brief) about yesterday's emergency declaration at the Millstone nuclear power station. The publicly available reports are sketchy and contradictory. Hopefully, someone will figure out what happened and fix it before the reactor restarts.

Thanks,
Dave Lochbaum
UCS

CC: <NAS@nrc.gov>

A156

THE MILLSTONE UNIT 3 EVENT – REV. 0

N clear Regulatory Commission (NRC) Daily Event Report No. 41607 provided sketchy and incomplete information about an emergency declared on Sunday April 17, 2005 at Millstone Unit 3. This Issue Brief attempts to explain the event from the sparse details publicly available. It is anticipated that this Issue Brief will be revised as the full story emerges.

I appears – although the initial reports are very fuzzy on this point – the problem started when several main steam relief valves opened with the reactor operating at full power. These valves are located on the pipes that carry steam from the steam generators to the main turbine. (In the figure, these valves are represented by a single "Relief Valve" located in the upper left corner of the Turbine Building.) Steam flowed through these opened valves and to the turbine. This high rate of steam flow apparently triggered automatic sensors that monitor for ruptures of the steam piping. These sensors caused a safety injection signal and an automatic trip of the reactor.

I appears that the automatic safety injection signal was not successful in causing the safety injection system to start. The report suggests that the operators had to manually complete the initiation sequence. The safety injection system (which appears in the lower left corner of the figure) takes water from a large tank outside the plant and supplies it to the loop of water circulating through the reactor core. Because this loop of water – termed the reactor coolant system and the primary loop – was intact, the flow from the safety injection system filled the pressurizer (shown slightly above dead center in the figure) and caused one primary system safety valve to open. (The primary system safety valve is loosely represented by the "Relief Valve" shown above and to the left of the pressurizer.)

T e operators also manually assisted another automatic safety action that had only halfway initiated. They took steps to close the main steam isolation valves (represented by the vertical 'bow-tie' just above the turbine at the upper right portion of the figure.) The heat produced by the nuclear fuel is normally routed to the main condenser during normal operation and during shutdown and transferred to water drawn from the sound. Closure of the main steam isolation valves eliminated this pathway for decay heat removal. Instead, the atmospheric steam dump valves (not shown on the figure, but located on the steam pipes between the "Relief Valve" and the main steam isolation valves) opened to discharge the heat in the form of steam directly to the atmosphere.

T e auxiliary feedwater system automatically initiated. The auxiliary feedwater pumps are the backup to the feedwater pumps that normally supply makeup water to the steam generators. (The auxiliary feedwater pump appears in the lower right portion of the figure.)

O erators turned off the safety injection system and relied on the charging system to periodically makeup water to the reactor coolant system. (The charging/safety injection pump appears on the left side of the figure.) The initial reports indicate that a couple of valves in the charging system leaked water into the auxiliary building, but that those leaks have now been found and fixed.

A 7:03 pm, operators placed Millstone Unit 3 in the hot shutdown condition. With plant stable, focus now turns to figuring out what made it so unstable and fixing the many things that didn't work as intended.

P epared by: David Lochbaum April 18, 2005 – Rev. 0

Washington Office: 1707 H Street NW Suite 600 Washington DC 20006-3919 202-223-6133 FAX: 202-223-6162
Cambridge Headquarters: Two Brattle Square Cambridge MA 02238-9105 617-547-5552 FAX: 617-864-9405
California Office: 2397 Shattuck Avenue Suite 203 Berkeley CA 94704-1567 510-843-1872 FAX: 510-843-3785

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions